28

## **CLAIMS**

## 1. Ruthenium(II) compound of formula (I):

wherein: R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> independently represent H, (C<sub>1</sub>-C<sub>6</sub>)alkyl, (C<sub>2</sub>-C<sub>6</sub>)alkenyl, (C<sub>2</sub>-C<sub>6</sub>)alkynyl, hydroxy(C<sub>1</sub>-C<sub>6</sub>)alkyl, amino(C<sub>1</sub>-C<sub>6</sub>)alkyl, halo, hydroxyl,  $CO_2R^7$ ,  $CONR^8R^9$ ,  $COR^{10}$ ,  $SO_3H$ ,  $SO_2NR^{11}R^{12}$ , aryloxy,  $(C_1-C_1)^{-1}$ C<sub>6</sub>)alkoxy, (C<sub>1</sub>-C<sub>6</sub>)alkylthio, -N=N-R<sup>13</sup>, NR<sup>14</sup>R<sup>15</sup>, aryl or aralkyl, which latter two groups are optionally substituted on the aromatic ring by one or more groups independently selected from (C<sub>1</sub>-C<sub>6</sub>)alkyl, (C<sub>2</sub>-C<sub>6</sub>)alkenyl, (C<sub>2</sub>- $C_6$ )alkynyl, hydroxy( $C_1$ - $C_6$ )alkyl, amino( $C_1$ - $C_6$ )alkyl, aryl, aralkyl, halo, hydroxyl, CO<sub>2</sub>R<sup>7a</sup>, CONR<sup>8a</sup>R<sup>9a</sup>, COR<sup>10a</sup>, SO<sub>3</sub>G, SO<sub>2</sub>NR<sup>11a</sup>R<sup>12a</sup>, aryloxy, (C<sub>1</sub>-C<sub>6</sub>)alkoxy, (C<sub>1</sub>-C<sub>6</sub>)alkylthio, -N=N-R<sup>13a</sup>, NR<sup>14a</sup>R<sup>15a</sup>, or R<sup>1</sup> and R<sup>2</sup> together with the ring to which they are bound represent a saturated or unsaturated carbocyclic or heterocyclic group containing up to three 3- to 8- membered carbocyclic or heterocyclic rings, wherein each carbocyclic or heterocyclic ring may be fused to one or more other carbocyclic or heterocyclic rings, and wherein each of the rings may be optionally substituted by one or more groups independently selected from (C<sub>1</sub>-C<sub>6</sub>)alkyl, (C<sub>2</sub>-C<sub>6</sub>)alkenyl, (C<sub>2</sub>-C<sub>6</sub>)alkynyl, hydroxy( $C_1$ - $C_6$ )alkyl, amino( $C_1$ - $C_6$ )alkyl, aryl, aralkyl, halo, hydroxyl,  $CO_2R^{76}$ , CONR<sup>8b</sup>R<sup>9b</sup>, COR<sup>10b</sup>, SO<sub>3</sub>G', SO<sub>2</sub>NR<sup>11b</sup>R<sup>12b</sup>, aryloxy, (C<sub>1</sub>-C<sub>6</sub>)alkylthio, -N=N- $R^{13b}$ ,  $NR^{14b}R^{15b}$  or  $(C_1-C_6)$ alkoxy;

one or more of R<sup>1</sup> to R<sup>6</sup> optionally being covalently bonded via a carbon-carbon, carbon-nitrogen or carbon-oxygen bond to another R<sup>1</sup> to R<sup>6</sup> group on another compound of formula (I);

 $R^7$ ,  $R^8$ ,  $R^9$ ,  $R^{10}$ ,  $R^{11}$ ,  $R^{12}$ ,  $R^{13}$ ,  $R^{14}$ ,  $R^{15}$ ,  $R^{7a}$ ,  $R^{8a}$ ,  $R^{9a}$ ,  $R^{10a}$ ,  $R^{11a}$ ,  $R^{12a}$ ,  $R^{13a}$ ,  $R^{14a}$ ,  $R^{15a}$ ,  $R^{7b}$ ,  $R^{8b}$ ,  $R^{9b}$ ,  $R^{10b}$ ,  $R^{11b}$ ,  $R^{12b}$ ,  $R^{13b}$ ,  $R^{14b}$  and  $R^{15b}$  are independently selected from H, ( $C_1$ - $C_6$ )alkyl, aryl or aralkyl;

X is a neutral or negatively charged O-, N- or S- donor ligand or halo;

G and G' are independently selected from alkali metals, aryl, aralkyl and (C<sub>1</sub>-C<sub>6</sub>) alkyl;

Y is NR<sup>16</sup>R<sup>17</sup> and Y' is NR<sup>18</sup>R<sup>19</sup>, wherein R<sup>16</sup>, R<sup>17</sup>, R<sup>18</sup> and R<sup>19</sup> are independently selected from H, (C<sub>1</sub>-C<sub>6</sub>)alkyl, aryl or aralkyl;

L is 1,2-arylene, 1,2-(C<sub>5</sub>-C<sub>8</sub>)cycloalkylene or (C<sub>2</sub>-C<sub>6</sub>)alkylene, provided that when L is (C<sub>2</sub>-C<sub>6</sub>)alkylene, one of R<sup>16</sup> and R<sup>17</sup> is covalently bonded to one of R<sup>18</sup> and R<sup>19</sup> such that they form with L a ring containing Y and Y', said 1,2arylene, 1,2-(C5-C8)cycloalkylene and (C2-C6)alkylene groups being optionally fused with one or more saturated or unsaturated carbocyclic or heterocyclic groups containing up to three 3- to 8- membered carbocyclic or heterocyclic rings, wherein each carbocyclic or heterocyclic ring may be fused to one or more other carbocyclic or heterocyclic rings, said 1,2-arylene, 1,2-(C5-C<sub>8</sub>)cycloalkylene and (C<sub>2</sub>-C<sub>6</sub>)alkylene groups and/or the groups to which they are fused being optionally substituted with one or more groups independently selected from (C<sub>1</sub>-C<sub>6</sub>)alkyl, (C<sub>2</sub>-C<sub>6</sub>)alkenyl, (C<sub>2</sub>-C<sub>6</sub>)alkynyl, hydroxy(C<sub>1</sub>-C<sub>6</sub>)alkyl, amino(C<sub>1</sub>-C<sub>6</sub>)alkyl, halo, hydroxyl, nitro, CO<sub>2</sub>R<sup>7</sup>, CONR<sup>8</sup>'R<sup>9</sup>, COR<sup>10</sup>, SO<sub>3</sub>H, SO<sub>2</sub>N R<sup>11</sup> R<sup>12</sup>, aryloxy, (C<sub>1</sub>-C<sub>6</sub>)alkoxy, (C<sub>1</sub>-C<sub>6</sub>)alkylthio, -N=N-R<sup>13'</sup>, NR<sup>14'</sup>R<sup>15'</sup>, aryl or aralkyl, and having one or more CH<sub>2</sub> groups optionally replaced by C=O groups, wherein R7', R8', R9', R10', R11', R12', R13', R14' and R<sup>15</sup> are independently selected from H, (C<sub>1</sub>-C<sub>6</sub>)alkyl, aryl or aralkyl;

m is -2, -1, 0, +1 or +2 and the compound comprises a counterion when m is not 0;

the compound of formula (I) optionally being in the form of a dimer in which two L groups are linked either directly or through a group comprising one or more of (C<sub>1</sub>-C<sub>6</sub>)alkylene, (C<sub>1</sub>-C<sub>6</sub>)alkenylene, arylene, aralkylene, alkarylene, Se, Se-Se, S-S, N=N and C=O or in which L bears two Y groups and two Y' groups;

provided that when R<sup>2</sup>, R<sup>3</sup>, R<sup>5</sup> and R<sup>6</sup> are all H, X is chloro, Y and Y' are both NH<sub>2</sub> and L is 1,2-phenylene, R<sup>1</sup> is not CH<sub>3</sub> when R<sup>4</sup> is CH(CH<sub>3</sub>)<sub>2</sub> and R<sup>1</sup> and R<sup>4</sup> are not both H.

- 2. Compound as claimed in Claim 1, wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup> and R<sup>6</sup> are independently selected from H, (C<sub>1</sub>-C<sub>6</sub>)alkyl and phenyl or R<sup>1</sup> and R<sup>2</sup> together with the ring to which they are bound represent indan, anthracene or a hydrogenated derivative of anthracene, said phenyl, indan and anthracene or a hydrogenated derivative of anthracene group being optionally substituted by one or more groups independently selected from (C<sub>1</sub>-C<sub>6</sub>)alkyl, (C<sub>2</sub>-C<sub>6</sub>)alkenyl, (C<sub>2</sub>-C<sub>6</sub>)alkynyl, hydroxy(C<sub>1</sub>-C<sub>6</sub>)alkyl, amino(C<sub>1</sub>-C<sub>6</sub>)alkyl, phenyl, benzyl, halo, hydroxyl, carboxyl, CO<sub>2</sub>(C<sub>1</sub>-C<sub>6</sub>)alkyl, CONH<sub>2</sub>, COH, CO(C<sub>1</sub>-C<sub>6</sub>)alkyl, SO<sub>3</sub>H, SO<sub>2</sub>NH<sub>2</sub>, phenoxy, (C<sub>1</sub>-C<sub>6</sub>)alkylthio, NH<sub>2</sub> or (C<sub>1</sub>-C<sub>6</sub>)alkoxy.
- 3. Compound as claimed in Claim 1 or Claim 2, wherein m is +1.
- -4. Compound as claimed in any one-of-Claims 1 to-3, wherein X is halo.

5. Compound as claimed in any one of Claims 1 to 4, wherein Y-L-Y' is selected from ligands of formulae (II) to (IV):

wherein: n is 1, 2 or 3, each pair of groups R<sup>8d</sup> and R<sup>9d</sup> are the same or different when n is 2 or 3; and

R<sup>1c</sup> to R<sup>9c</sup>, R<sup>1d</sup> to R<sup>9d</sup> and R<sup>1e</sup> to R<sup>4e</sup>, are independently selected from H, (C<sub>1</sub>-C<sub>6</sub>)alkyl, (C<sub>2</sub>-C<sub>6</sub>)alkenyl, (C<sub>2</sub>-C<sub>6</sub>)alkynyl, hydroxy(C<sub>1</sub>-C<sub>6</sub>)alkyl, amino(C<sub>1</sub>-C<sub>6</sub>)alkyl, halo, hydroxyl, CO<sub>2</sub>R<sup>7'</sup>, CONR<sup>8'</sup>R<sup>9'</sup>, COR<sup>10'</sup>, SO<sub>3</sub>H, SO<sub>2</sub>N R<sup>11'</sup>R<sup>12'</sup>, aryloxy, (C<sub>1</sub>-C<sub>6</sub>)alkoxy, (C<sub>1</sub>-C<sub>6</sub>)alkylthio, -N=N-R<sup>13'</sup>, NR<sup>14'</sup>R<sup>15'</sup>, aryl or aralkyl, and one or more of pairs of groups R<sup>1c</sup> to R<sup>9c</sup>, R<sup>1d</sup> to R<sup>9d</sup> and R<sup>1e</sup> to R<sup>4e</sup> that are bonded to the same or adjacent carbon atoms are optionally covalently bonded

to each other to form a saturated or unsaturated carbocyclic or heterocyclic group,

and Y-L-Y' is optionally in the form of a dimer in which two compounds of formula (II), two compounds of formula (III) or two compounds of formula (IV) are directly covalently bonded to each other.

- 6. Compound as claimed in Claim 5, wherein R<sup>16</sup>, R<sup>17</sup>, R<sup>18</sup> and R<sup>19</sup> are all H.
- 7. Compound as claimed in Claim 5 or Claim 6, wherein  $R^{1c}$  to  $R^{9c}$ ,  $R^{1d}$  to  $R^{9d}$  and  $R^{1e}$  to  $R^{4e}$ , are independently selected from H,  $(C_1-C_6)$ alkyl, hydroxy $(C_1-C_6)$ alkyl, amino $(C_1-C_6)$ alkyl, halo, hydroxyl,  $CO_2(C_1-C_6)$ alkyl and  $(C_1-C_6)$ alkoxy.
- 8. Compound as claimed in Claim 5, wherein Y-L-Y' is a ligand of formula (V)

$$\begin{array}{c|c}
R & 1f & NH_2 \\
\hline
 & NH_2 \\
R & 2f & R & 4f \\
\hline
 & (V) & & & \\
\hline
\end{array}$$

wherein  $R^{1f}$ ,  $R^{2f}$ ,  $R^{3f}$  and  $R^{4f}$  are independently selected from H,  $(C_1-C_6)$ alkyl,  $(C_2-C_6)$ alkenyl,  $(C_2-C_6)$ alkynyl, hydroxy( $C_1-C_6$ )alkyl, amino( $C_1-C_6$ )alkyl, halo, hydroxyl,  $CO_2R^{7'}$ ,  $CONR^{8'}R^{9'}$ ,  $COR^{10'}$ ,  $SO_3H$ ,  $SO_2NR^{11'}R^{12'}$ , aryloxy,  $(C_1-C_6)$ alkoxy,  $(C_1-C_6)$ alkylthio,  $-N=N-R^{13'}$  and  $NR^{14'}R^{15'}$ .

9. Compound as claimed in Claim 5, wherein Y-L-Y' is a ligand of formula (VIA) or (VIB)

 $NH_2$ 

NH<sub>2</sub>

<sub>R</sub>6g

wherein  $R^{1g}$ ,  $R^{2g}$ ,  $R^{3g}$ ,  $R^{4g}$ ,  $R^{5g}$  and  $R^{6g}$  are independently selected from H, (C<sub>1</sub>-C<sub>6</sub>)alkyl, (C<sub>2</sub>-C<sub>6</sub>)alkenyl, (C<sub>2</sub>-C<sub>6</sub>)alkynyl, hydroxy(C<sub>1</sub>-C<sub>6</sub>)alkyl, amino(C<sub>1</sub>-C<sub>6</sub>)alkyl, halo, hydroxyl,  $CO_2R^{7'}$ ,  $CONR^{8'}R^{9'}$ ,  $COR^{10'}$ ,  $SO_3H$ ,  $SO_2NR^{11'}R^{12'}$ , aryloxy, (C<sub>1</sub>-C<sub>6</sub>)alkoxy, (C<sub>1</sub>-C<sub>6</sub>)alkylthio, -N=N-R<sup>13'</sup> and  $NR^{14'}R^{15'}$ .

- 10. Compound as claimed in Claim 8, wherein  $R^{1f}$ ,  $R^{2f}$ ,  $R^{3f}$  and  $R^{4f}$  are independently selected from H,  $(C_1-C_6)$  alkyl and hydroxyl.
- 11. Compound as claimed in Claim 9, wherein  $R^{1g}$ ,  $R^{2g}$ ,  $R^{3g}$ ,  $R^{4g}$ ,  $R^{5g}$  and  $R^{6g}$  are all H.
- 12. Compound of formula (I) according to any one of Claims 1 to 11 without the proviso, for use in medicine.
- 13. Use of a compound of formula (I) according to any one of Claims 1 to 11 without the proviso, in the manufacture of a medicament for the treatment and/or prevention of cancer.

WO 2004/096819 PCT/GB2004/001837

34

- 14. Pharmaceutical composition comprising a compound of formula (I) according to any one of Claims 1 to 11 without the proviso, together with one or more pharmaceutically acceptable excipients.
- 15. A method of treating and/or preventing cancer which comprises administering to a subject a therapeutically effective amount of a compound of formula (I) according to any one of Claims 1 to 11 without the proviso, or a composition of Claim 14.
- 16. Process for preparing the compound of any one of Claims 1 to 11 which comprises the reaction of a compound of formula  $[(\eta^6-C_6(R^1)(R^2)(R^3)(R^4)(R^5)(R^6))RuX_2]$ , optionally in the form of a dimer, with Y-L-Y', in a suitable solvent for the reaction, wherein  $R^1, R^2, R^3, R^4, R^5, R^6, X, Y, Y'$  and L are as defined in Claim 1.